

## CLAIMS

What is claimed is:

1. A method of quality of service localization within a relatively time-invariant communications network comprising:

receiving quality of service estimations for a plurality of communications mediums, wherein each of the plurality of communications mediums is defined between a respective one of a plurality of transmitters located within the communications

10 network to a common receiving point of the communications network, wherein each communications medium is conveyed over at least one shared physical communications path and at least one non-shared physical communications path; and

15 comparing the quality of service estimations in order to localize a respective quality of service estimation to a likely physical communication path within the communications network.

2. The method of Claim 1 further comprising localizing, based upon the comparing, the respective quality of service estimation to the likely physical communication path associated 20 with the respective quality of service estimation.

25 3. The method of Claim 2 wherein the localizing comprises localizing the respective quality of service estimation to the likely physical communication path without physically inspecting the likely physical communication path.

30 4. The method of Claim 1 wherein the respective quality of service estimation represents a degradation in a desired quality of service for the communication network.

5. The method of Claim 1 wherein each of the plurality of communication mediums utilizes a known and unique physical path.

5 6. The method of Claim 1 wherein the communication network comprises a cable modem communication network.

10 7. The method of Claim 1 further comprising determining that the likely physical communication path comprises a shared physical communication path.

15 8. The method of Claim 1 further comprising determining that the likely physical communication path is a non-shared communication path.

20 9. The method of Claim 1 further comprising continuing existing services provided in the communication network during the receiving and comparing steps such that the existing services are not interrupted.

25 10. The method of Claim 1 wherein the receiving comprises receiving the quality of service estimations from a memory.

11. The method of Claim 1 further comprising monitoring the respective quality of service estimation over time in order to detect changes in the respective quality of service estimation of the likely physical communication path.

30 12. A system for quality of service localization within a relatively time-invariant communications network comprising:

means for receiving quality of service estimations for a plurality of communications mediums, wherein each of the plurality of communications mediums is defined from a respective one of a plurality of transmitters located within the communications

5 network to a common receiving point of the communications network, wherein each communications medium is conveyed over at least one shared physical communications path and at least one non-shared physical communications path; and

means for comparing the quality of service estimations  
10 in order to localize a respective quality of service estimation to a likely physical communication path within the communications network.

15 13. The method of Claim 12 further comprising means for localizing, based upon the comparing, the respective quality of service estimation to the likely physical communication path associated with the respective quality of service estimation.

20 14. The method of Claim 13 wherein the means for localizing comprises means for localizing the respective quality of service estimation to the likely physical communication path without physically inspecting the likely physical communication path.

25 15. The method of Claim 12 wherein the respective quality of service estimation represents a degradation in a desired quality of service of the communication network.

30 16. The method of Claim 12 further comprising means for determining that the likely physical communication path comprises a shared physical communication path.

17. The method of Claim 12 further comprising means for determining that the likely physical communication path is a non-shared communication path.

5 18. The method of Claim 12 further comprising means for monitoring the respective quality of service estimation over time in order to detect changes in the respective quality of service estimation of the likely physical communication path.

10 19. A system for quality of service localization comprising:  
comprising:  
a relatively time-invariant communications network comprising:  
a common receiving point;  
a plurality of transmitters for transmitting  
15 signaling to the common receiving point; and  
a plurality of communications mediums coupling  
respective ones of the plurality of transmitters to the common receiving point, wherein each of the plurality of communications mediums is conveyed over at least one shared physical communications path and at least one non-shared physical communications path to the common receiving point; and  
20 a quality of service localizer coupled to the common receiving point, wherein the quality of service localizer localizes, based upon the analysis of quality of service estimations received from the common receiving point, a particular quality of service estimation to a likely physical communication path within the communications network.

30 20. The system of Claim 19 further comprising a distortion estimator coupled to the receiver and the quality of

service localizer, wherein the distortion estimator determines the quality of service estimation for each of the plurality of communications mediums.

5           21. The system of Claim 19 further comprising a memory coupled to the quality of service localizer.

10           22. The system of Claim 19 further comprising a network controller coupled to the quality of service localizer.

15           23. The system of Claim 19 wherein the common receiving point comprises a plurality of receivers.

20           24. The system of Claim 19 wherein the common receiving point comprises a single receiver.

25           25. The system of Claim 19 wherein the common receiving point comprises a cable modem termination system of a cable modem communication network.

20           26. The system of Claim 25 wherein the cable modem termination system includes the quality of service localizer.

25           27. The system of Claim 19 wherein the at least one shared physical communication path comprises a fiber link or a cable link.

30           28. The system of Claim 19 wherein one or more of the plurality of transmitters are coupled to the common receiving point via a hub.

29. The system of Claim 19 wherein a respective one or more of the plurality of transmitters are coupled to the common receiving point via a respective one of a plurality of hubs.